

Pricing Disparities for Minority Communities in Chicago: Rideshares and Taxis

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ABSTRACT

Racial minorities have faced a history of discrimination in transportation access and pricing. Transportation Network Providers (TNP) – like Uber or Lyft – may offer more equitable access to transportation for minorities. Using a random sample of 5.6 million taxi and ridesharing rides taken over an 11-month period spanning 2018-2019 in 77 Chicago Community Areas, I estimate the difference in group mean fare for rides in minority and nonminority communities taken through a Taxi company or a Transportation Network Provider (TNP). I find that for rides in minority communities, TNPs offer lower fares than taxis but fares are still higher than those for similar TNP rides in non-minority communities. On average, TNP trips were 19.4% cheaper than taxis for trips between nonwhite communities but 12.2% more expensive than similar TNP trips between white communities. TNP rides in Black communities were about 11% less expensive than taxis but those rides were about 4.6% more expensive than similar rides in non-Black communities.

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Since 2011, Transportation Network Providers (TNPs)¹ such as Uber and Lyft, have revolutionized the transportation industry. By connecting drivers with potential riders, TNPs compete with taxis while avoiding regulations which hinder their competition. Since TNPs are afforded less regulatory scrutiny by local governments, the question of whether the benefits from TNPs are distributed equally is raised.

Pricing data at the trip-level for TNPs is rarely released publicly, this paper will utilize new data released by the City of Chicago to observe how average fares differ between minority and non-minority communities. Using a random sample of over 5.6 million taxi and TNP trips collected in Chicago over 11-monthes from 2018-2019, this paper will estimate the difference in group average fare in minority and nonminority communities between TNPs and taxis. I find that while TNPs offer service in minority communities for less on average than taxis, TNP trips within minority communities are more expensive than similar TNP trips between non-minority communities.

These results fit with Smart *et al.* (2015)'s finding that UberX arrives faster and provides cheaper service than taxicabs in minority Los Angeles communities. The findings in Kooti *et al.* (2017) that surge pricing does not bias Uber use towards higher income riders may help explain my findings. By expanding beyond wait-times, this paper provides new evidence on disparate outcomes between minority and non-minority communities for TNPs. Since this paper examines data from a less-than-1-year period, it does not show how the disparate outcomes change over time.

1 RELATED LITERATURE:

Since the sharing-economy has revolutionized the economy, discrimination in the sharing-economy has come under focus. A growing body of research shows human biases carry over to peer-to-peer apps. In an experimental study, Edelman *et al.* (2017) show booking an Airbnb with an African American sounding name decreases the chance of successful booking by 16%. This discrimination is not unique to Airbnb. In Seattle Washington and Boston Massachusetts, Ge *et al.* (2016) find that UberX passengers with African American sounding names experience as much as 35% longer wait times due to driver cancelations.

While there is evidence of individual discrimination on peer-to-peer platforms, it is unclear how this translates to the aggregate. Using quasi-randomly collected API requests, Hughes and Mackenzie (2016) find expected wait times in Seattle are shorter in neighborhoods with lower average incomes and larger minority populations. In a study funded by Uber, Smart *et al.* (2015) find that UberX rides arrive faster and are cheaper than hailing taxicabs in low income and minority Los Angeles communities. Kooti *et al.* (2017) find surge pricing does not bias Uber use towards higher income riders.

When considering the impact of TNCs it is also important to observe how they compare to the industry they are disrupting. Using a combination of field surveys and trip level data, Brown (2018) finds taxis in Los Angeles are 11% more likely to cancel rides for Black passengers than for white passengers but no statistical difference in cancellation for Uber or Lyft rides.

¹ Note: this paper will use TNP, rideshare and ride-hail synonymously.

2 DESCRIPTION OF DATA:

This paper will use a 5% random sample from 112,787,771 taxi and TNP rides taken during a 10-month period from winter 2018 to fall 2019 in the 77 community areas of Chicago. Ride observations are taken from datasets maintained by the City of Chicago. Included in these datasets are: a unique trip identifier, start and end timestamp (rounded to nearest 15-minute), duration (in seconds), distance traveled (in miles), pickup and drop-off community areas, fare subtotal, tip², additional charges (tolls + ‘extras’), and fare total for each trip observed. Since this paper is primarily concerned with the average difference in cost experienced by minority-communities versus white communities for similar rides, only observations with nonzero and nonnull values for fare (total and subtotal), distance and duration are included. Furthermore, trips with implausible values — distance greater than 300 miles, trip time above 21600 seconds (6 hours) or average speed above 80mph — are discarded. Likewise, observations with subtotal fare

	Count	Mean	Std. Dev	Min	25%	50%	75%	Max
Duration (seconds)	5,596,195	1079.8	798.7	2	526	855	1401	21409
Distance (miles)	5,596,195	5.9558	6.7561	0.01	1.70	3.5	7.50	288.3
Ride Pooled indicator	5,596,195	0.1960	0.3970	0	0	0	0	1
# Rides Pooled	5,596,195	1.2317	0.6899	1	1	1	1	16
Rideshare indicator	5,596,195	0.8886	0.3146	0	1	1	1	1
Majority-minority pickup indicator	5,596,195	0.1537	0.3607	0	0	0	0	1
Majority-minority drop-off indicator	5,596,195	0.1485	0.3556	0	0	0	0	1
Fare	5,596,195	\$12.05	\$10.47	\$0.01	\$5.00	\$8.00	\$15.00	\$482.50
Total Fare	5,596,195	\$15.80	\$12.52	\$0.01	\$7.55	\$12.00	\$17.55	\$491.35

Sources: Chicago Department of Business Affairs & Consumer Protection ([2016](#); [2018](#)), CMAP ([2019](#))

Notes:

Majority-minority indicators are defined as 1 if >50% of the population belongs to the same nonwhite racial group for corresponding Chicago Community Area.

Only nonnull-nonzero observations for duration, distance, and fare (total and subtotal).

Observations with distance > 300 miles, duration > 21600 seconds, or average speed > 80mph are discarded.

² Cash tips are generally not recorded. Since cash is used more often used to tip taxi drivers vs. their TNP counterparts, there may be a reporting bias which lowers tips (and therefore total fare) for taxi trips relative to TNP trips. Analysis will be done using both fare subtotal and fare total to account for this.

above \$500 or total fare above \$1000 are discarded because these observations are almost entirely encoding errors.³

Data on 13,278,139 taxi trips were taken from Chicago's *Taxi Trips*⁴ dataset. This dataset records trip-level observations of nearly all taxi trips taken within the city since January 1st, 2013 and is updated monthly. Data are collected by the Chicago Department of Business Affairs & Consumer Protection (BACP) through reports from major payment processors which BACP believe to cover most taxis in Chicago.

It is worth noting the taxi trips dataset was rereleased in July 2019 to capture previously missed observations.⁵ The curators of the dataset believe they have fully resolved the underlying issue, though some records were not obtainable, specifically observations for the Flash Taxi Fleet between November 2014 and December 2015. As such, I have decided to only include observations coinciding with the timeframe of the TNP Trips dataset. I do not believe the missing data will affect the veracity of this study.

Data on 99,509,632 TNP trips were taken from Chicago's *Transportation Network Providers – Trips* dataset.⁶ This dataset is the record of all TNP trips taken since November 1st, 2018, updated quarterly. I have taken trip observations which start after 12:00:00am November 1st, 2018 and end before 12:00:00am October 1st, 2019 for analysis in this paper.

Since much of the information I am interested in is encoded by location, I have chosen to utilize location encoding by Chicago Community Area⁷ level. To anonymize the dataset, Chicago does not report the census tract for rides in tracts with fewer than 10 rides occurring in a 15-minute window, which will disproportionately affect small communities⁸. To reduce bias associated with disproportionate null values for smaller communities, I have chosen not to use census tract data. Demographic data is collected from the Chicago Metropolitan Agency for Planning (CMAP) 2017 Community Data Snapshots⁹. This is a curated dataset which aggregates data to the Community Area level from several data sources¹⁰, mostly the 5-year average American Community Survey, Illinois Department of Revenue and Illinois Department of Employment Security. Since most of the data comes from the ACS 5-year average, which is a sample-based product, data from low-population community areas are subject to larger error-terms¹¹.

³ These observations are from the Taxi dataset, and charge >\$500 for rides with average length of 15 minutes and average distance of 6.6 miles. Observations encoded correctly in this subsample are probably limos or other luxury service outside the purview of this study.

⁴ Department of Business Affairs & Consumer Protection (2016)
<https://data.cityofchicago.org/Transportation/Taxi-Trips/wrvz-psew>

⁵ Open Data Portal Team (2019)
<http://dev.cityofchicago.org/open%20data/data%20portal/2019/07/01/taxi-dataset-relaunch.html>

⁶ Department of Business Affairs & Consumer Protection (2018)
<https://data.cityofchicago.org/Transportation/Transportation-Network-Providers-Trips/m6dm-c72p>

⁷ Originally defined by Social Science Research Committee at the University of Chicago in the 1920s. There are 77 Community Areas each of which are comprised of several neighborhoods and census tracts. Unlike census tracts CCA borders are static. See:

https://www.chicago.gov/content/dam/city/depts/doit/general/GIS/Chicago_Maps/Community_Areas/MapBook_Community_Areas.pdf

⁸ ~35% of raw Taxi and ~25% of the raw TNP data have null values for both pickup and drop-off census tracts.

⁹ CMAP (2019) <https://datahub.cmap.illinois.gov/dataset/community-data-snapshots-raw-data>

¹⁰ For more details, see: <https://datahub.cmap.illinois.gov/dataset/1d2dd970-f0a6-4736-96a1-3caeb431f5e4/resource/d23fc5b1-0bb5-4bcc-bf70-688201534833/download/CDSFieldDescriptions201906.pdf>

¹¹ I do not correct for this, but it is less of an issue since Community Areas are large enough that their estimates are generally statistically significant.

The trip datasets capture rides which may either begin or end outside of Chicago city limits. Such rides are encoded as null in the original dataset. As such, null values in this dataset contain information relevant to our question. I will address these null values in three ways:

1. Dropping the null values
2. Filling the null values with the mean values from the 77 community areas
3. Filling the null values with the mean from the Chicago Metropolitan Statistical Area

Each Solution comes with its own advantages and drawbacks. Dropping the null values makes no assumptions about the demographics outside Chicago but will potentially remove information relevant to my question. Filling the null values with the mean value from the 77 community areas ensures all information is uniformly sourced (from CMAP Community Snapshots) and every variable will have a value. However, it implicitly assumes communities around Chicago are demographically similar to those within Chicago, which is a strong assumption. The third

option would remove such an assumption but at the cost of uniformity and inclusion of controls for which data is not available¹².

Count (%) of Trips Picking up and Dropping-off in Majority-Minority Community Areas		
<i>Table 2-2:</i>	Drop-off	Not Drop-off
Pickup	430,190 (7.7%)	429,994 (7.7%)
Not Pickup	400,854 (7.2%)	4,335,156 (77%)

(Percent's have been rounded)

To determine whether a community is a minority community, this paper will use two methods:

1. **Majority-Minority** indicator =1 if a single nonwhite racial group makes up $\geq 50\%$ population in that community area. (See *Table 2-2*)
2. **Majority-Nonwhite** indicator =1 if white racial group makes up $< 50\%$ of population in that community area. When using Majority-Nonwhite indicators, it is important to define how null values are filled since this will change whether community areas with community area marked null will be capture. (See *Tables 2-3 & 2-4*)

Count (%) of Trips Picking up and Dropping-off in Majority-Nonwhite Community Areas		
<i>Table 2-3:</i>	Drop-off	Not Drop-off
Pickup	1,360,929 (24%)	1,001,003 (18%)
Not Pickup	1,033,430 (18%)	2,200,832 (39%)

Null Values Filled Using Local Averages
(Percent's have been rounded)

Count (%) of Trips Picking up and Dropping-off in Majority-Nonwhite Community Areas		
<i>Table 2-4:</i>	Drop-off	Not Drop-off
Pickup	1,065,310 (19%)	982,398 (18%)
Not Pickup	959,774 (17%)	2,588,712 (46%)

Null Values Filled Using MSA Estimates
(Percent's have been rounded)

3 METHODOLOGY:

This paper will use an observational design to measure the difference in group average fare for minority communities and majority-white communities traveling by taxi or rideshare. Group averages will be measured using OLS estimates regressing fare on dummies for rideshare, minority pickup community area, minority drop-off community area and interactions terms for

¹² Any control variable not found in or derived from the 2017 ACS 5-year average is not included for models using (3) from the list of null-handling methods. Control variable observations at the metropolitan statistical area level are created using my best approximation of CMAP's methods.

those dummies. To check the robustness of these results, I will add several groups of control variables, time fixed effects¹³, and test different definitions for fare and minority-community. As discussed previously, I will also test different methods of handling null-values for community-area level control variables.

Due to constraints in the data available, this paper cannot establish a causal link between rideshare in minority-communities and average fare. An event study is not possible because TNP services entered Chicago as early as 2011¹⁴, and the earliest available data begins in 2013 for taxi data and 2018 for TNP data. An instrumental variables approach is not viable because trip data has been anonymized such that there can be no instrument to predict if a ride will be a rideshare or taxi. Likewise, no instrument can predict whether a community area is minority. Despite this shortcoming, this paper still will offer valuable insight on how the benefits from new TNPs differ on average between majority-white and minority communities.

At the most basic level, taxis and rideshares are follow a linear model of pricing. There is a base fee to start the ride, then the fare is determined time elapsed (duration) and distance traveled. Thus, I have setup a naïve model as:

$$(1) \text{ Fare}_i = \beta_0 + \beta_1 * \text{Distance}_i + \beta_2 * \text{Duration}_i + \epsilon_i$$

Though in theory this model works perfectly for individual cabs with posted rates, when generalizing this case to any cab, it becomes evident that cab companies (and TNPs) will have different β_1 and β_2 depending on if they are a ‘standard’ service — like UberX or a yellow cab — a ‘premium’ service — like UberBLACK or a town car — or a ‘luxury’ service — like UberLUX or a limo. Factoring this in, it becomes clear that β_1 and β_2 have a log-linear relationship with fare since 1 additional mile and 1 additional second will change fare by a percentage according that trips ‘service’. This gives rise to:

$$(2) \text{ Log}(\text{Fare}_i) = \beta_0 + \beta_1 * \text{Distance}_i + \beta_2 * \text{Duration}_i + \epsilon_i$$

In order measure the difference in group mean fare between rideshare and taxi I will include a dummy for rideshare. Since trips can depart from or arrive to a minority community, I must consider different ways of measuring what a minority community ride is. To this end, I consider two alternatives:¹⁵

- a. **Area-Level:** Dummy variables for picking up from minority community area and for dropping-off to a minority community area.
- b. **Route-Level:** A set of dummies for the 4 combinations of picking up and dropping off in minority community, excluding trips which begin and end in the same community. (See: *Table 2-2*): (pickup & drop-off), (pickup & not drop-off), (not pick & drop-off), (not pickup & not drop-off)¹⁶

These dummies and their interactions give rise to my main regressions:

¹³ Fixed effects by community area are not included because there is perfect multicollinearity between community-area effects and the majority-minority indicator.

¹⁴ Uber started offering services in Chicago beginning in September 2011.

¹⁵ the main difference between the two is whether to treat the minority-to-minority case specially.

¹⁶ (Not pickup not drop-off) is dropped to prevent falling into the dummy trap.

$$(3) \quad \text{Log}(\text{Fare}_i) = \beta_0 + \beta_1 * \text{Distance}_i + \beta_2 * \text{Duration}_i + \beta_3 * \text{Rideshare}_i + \beta_4 * \text{MinorityIndicators}_i + \beta_5 * \text{Rideshare}_i * \text{MinorityIndicators}_i + \epsilon_i^{17}$$

In this design, the variables of interest are β_3 , β_4 , and β_5 .¹⁸ The average difference in fare between TNPs and taxis is $\beta_3 + \beta_4$. The average difference in fare for minority communities compared to white communities is $\beta_4 + \beta_5$. For trips taken with taxis, the average difference in fare for minority communities is β_4 . For trips taken with TNPs, the average difference in fare for minority communities compared to white communities is β_5 .

To check the robustness of the results from design, I will be adding several combinations of controls. Trip-level controls include whether the ride is ‘pooled’ — TNP riders can share the ride with strangers traveling a similar route in exchange for a lower rate — and a set of time effects. Time effects are included to correct for seasonality by month, week, day of the week, and time of day.

I will also add community-area level controls in several groups. Each group comprises some kind control by demographic or characteristic of that community-area. These control groups are: Population, Economic, Income Distribution, Transportation, and Demographics (See: Table 5?). I control for population and population density since the population of a community area will affect how many people are traveling to that community area and therefore the supply of drivers. Also, I control for economic indicators and income distribution since they will affect the demand and elasticity of demand since hailing a ride is typically more expensive than public transportation (alternative lower income areas might rely more on hailing if they do not have access to their own vehicle). Controls for access to transportation are used since easily accessible public transportation is a competitor (or a complimentary service) to hailing a ride and therefore affects demand. Demographics are controlled for since there may be variation in eagerness to use hailing services due to age, education or nativity.

4 RESULTS:

4.1 Overview of Results:

Though exact estimates are sensitive to variable definition and control selection, this paper finds a persistent trend of lower average fares for TNP rides which begin or end in a minority community. Much of the lower average price is attributed to the ability to ‘pool’ rides when hailing through a TNP (See Table 4.1-1). Controls for community-area level effects have statistically, but not economically significant impact on average trip price for ridesharing trips. The influence of controls is consistent for Majority-Minority communities and Majority-Nonwhite communities and all methods for filling null values.

¹⁷ Note: *MinorityIndicators_i* represents a set of indicators from (a) or (b) and defined as either Majority-minority or Majority-nonwhite.

¹⁸ Because *MinorityIndicators_i* is a set of indicators taken from either (a) or (b), β_4 and β_5 will be split up into multiple covariates (2 covariates for (a), 3 covariates for (b)), the formulas presented generalize to any indicator or combination of indicators.

<i>Table 4.1-1</i>	OLS Estimates of Rideshare and Minority Dummies on Fare, with Community Area Controls for: Population, Economic Status, Income Distribution, Transportation Access, and Demographic Factors								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)
Majority-Minority Pickup Indicator	0.0842 (0.0040)	0.0797 (0.0037)	0.0603 (0.0040)	0.0580 (0.0040)	0.1165 (0.0040)	0.1094 (0.0040)	0.0968 (0.0040)	0.0798 (0.0040)	0.0350 (0.0037)
Majority-Minority Drop-off Indicator	0.2172 (0.0029)	0.2127 (0.0027)	0.1879 (0.0029)	0.1642 (0.0030)	0.1913 (0.0030)	0.1946 (0.0029)	0.1954 (0.0030)	0.1556 (0.0030)	0.1132 (0.0028)
Rideshare Indicator	-0.3013 (0.0005)	-0.2378 (0.0005)	-0.3006 (0.0005)	-0.3092 (0.0005)	-0.2959 (0.0006)	-0.2961 (0.0006)	-0.2950 (0.0006)	-0.2947 (0.0006)	-0.2431 (0.0005)
Rideshare × Maj-Minority Pickup	-0.1296 (0.0040)	-0.0663 (0.0037)	-0.1291 (0.0040)	-0.1302 (0.0040)	-0.1398 (0.0040)	-0.1410 (0.0040)	-0.1312 (0.0040)	-0.1400 (0.0040)	-0.0690 (0.0037)
Rideshare × Maj-Minority Drop-off	-0.2490 (0.0030)	-0.1751 (0.0028)	-0.2488 (0.0030)	-0.2497 (0.0030)	-0.2516 (0.0029)	-0.2534 (0.0029)	-0.2530 (0.0030)	-0.2462 (0.0029)	-0.1700 (0.0027)
Pooled Population	-	Yes	-	-	-	-	-	-	Yes
Economic Income	-	-	Yes	-	-	-	-	Yes	Yes
Transportation Access	-	-	-	Yes	-	-	-	Yes	Yes
Demographic	-	-	-	-	Yes	-	-	Yes	Yes
Adjusted R²	0.6803	0.7257	0.6823	0.6833	0.6858	0.6875	0.6839	0.6890	0.7330
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194
Model df	7	8	11	15	21	29	19	67	68

Standard errors in parentheses.

Community Area Controls from 2017 CMAP Community Snapshot.

Observations with null community area values are filled with average value for Community Areas.

Notes:

Controlling ‘pooled’ rides explains a large amount of the difference in average fare between rideshare and taxi rides. Controlling for other community-area level factors has statistically significant but economically insignificant effects on ridesharing estimates but a more significant effect on Pickup/Dropoff indicators for taxi rides. Of the control groups, Transportation Access explains the greatest amount of variation. Results in this table are consistent with results seen using Majority-Nonwhite and all methods of filling null values.

<i>Table 4.1-2</i>	OLS Estimates of Average Fare for Area-Level Indicators: Majority-Minority & Majority-Nonwhite Community Areas			
	Majority-Minority		Majority-Nonwhite	
	(1) Log(Fare)	(2) Log(Total Fare)	(1) Log(Fare)	(2) Log(Total Fare)
Intercept	-108.8580 (12.8763)	-324.2096 (10.2725)	-194.2252 (12.8622)	-469.9891 (10.2594)
Pooled Ride Indicator	-0.3847 (0.0004)	-0.4328 (0.0003)	-0.3854 (0.0004)	-0.4335 (0.0003)
Minority-Pickup Indicator	0.0328 (0.0037)	-0.0334 (0.0030)	0.0648 (0.0014)	0.0788 (0.0011)
Minority-Dropoff Indicator	0.1099 (0.0028)	0.0751 (0.0022)	0.1009 (0.0013)	0.1334 (0.0010)
Rideshare Indicator	-0.2480 (0.0005)	-0.0529 (0.0004)	-0.2230 (0.0006)	-0.0236 (0.0005)
Rideshare × Minority-Pickup	-0.0677 (0.0037)	-0.0279 (0.0029)	-0.0445 (0.0012)	-0.0384 (0.0009)
Rideshare × Minority-Dropoff	-0.1679 (0.0027)	-0.1529 (0.0022)	-0.0796 (0.0011)	-0.0945 (0.0009)
R²	0.7364	0.7843	0.7364	0.7844
Model df	87	87	87	87
Observations	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.
Community-area controls are from CMAP(2019).
Null values for community-area control variables are filled with average value from Chicago community-areas
Includes controls for distance, duration, trip pooled indicator, time effects, community-area population, economic factors,
income distribution, transportation access, and demographic factors included.
Time Effects are sets of dummy variables for month, day of the week, and time of day.

4.2 Majority-Minority Results

When defining minority-communities by Majority-Minority (i.e. community areas where one racial group makes up $\geq 50\%$ of the population) I find TNP rides are typically cheaper than taxi rides overall and within minority-communities. This difference is more pronounced for subtotal fare than for total fare which suggests TNP rides offer lower base prices but some of this difference is lost after including tip and additional charges.¹⁹

After controlling for community-area and trip level effects, I find TNP rides' subtotals are 24.8% less than similar taxi rides on average. However, total costs for TNP rides are only 5.3%

¹⁹ Recall these datasets are not likely to record cash tips. So, some of this effect could be explained if Taxis are tipped in cash more often than TNPs.

less than similar taxi rides (See: *Table 4.1-2*). This suggests that some variation in subtotal fare are driven by differences in tip and ‘additional charges’ for the two datasets.

TNP rides which begin in minority communities have subtotals a further 6.8% less on top of the savings just from taking rideshare than similar taxi rides, but total fares are only 2.8% less (See: *Table 4.1-2*). When looking at taxi rides which begin in minority communities, the subtotal fare is 3.3% higher but the total fare is 3.3% lower than rides which begin in nonminority communities. This difference is not robust to different definitions of minority community which may suggest Majority-Minority captures rides with fundamental differences in tip and additional charges structure. Taxi rides dropping-off to Majority-Minority communities have about 10% higher subtotals and about 7% higher total fare than taxi rides dropping off to non-Majority-Minority communities.

TNP trips picking up from or dropping off to Majority-Minority communities are on average cheaper than TNP trips which pickup or drop-off from non-Majority-Minority communities. On average, TNP trips picking up from Majority-Minority communities have 3.5% lower subtotals and 6.1% lower total fares than TNP trips picking up from non-Majority-Minority communities. TNP trips dropping off to Majority-Minority communities have 5.8% lower subtotal and 7.8% lower total than TNP trips dropping-off to non-Majority-Minority communities. These results contradict the findings in all other designs which suggest TNP rides are *more* expensive for rides to minority-communities than non-minority communities.

4.3 Majority-Nonwhite Results

When defining minority community by Majority-Nonwhite some similar trends as Majority-Minority emerge, with one important difference: TNP rides picking up from or dropping off to nonwhite communities are more expensive than TNP rides which pickup from or drop-off to majority-white communities. Like we see with Majority-Minority, savings from TNP over taxi are muted when looking at total fare rather than subtotal fare, with subtotal fare ~ 22% less but only 2.3% less in total fare for ridesharing trips. We still see ridesharing trips picking up from nonwhite-communities saving an additional 4.4% subtotal and 3.8% total against similar taxi trips. We also see that ridesharing trips dropping off to nonwhite-communities save 7.9% subtotal and 9.4% total over similar taxi rides. These results line up with those under Majority-Minority.

In contrast to the results under Majority-Minority, trips which end in nonwhite communities are about 3.9% more expensive than trips which end in white communities, with about 9.5% lower fares for rideshare ending in nonwhite communities compared to 13.3% higher fares for taxi rides ending in Majority-Nonwhite neighborhoods.

I suspect one factor causing this disparity between Majority-Minority and Majority-Nonwhite is the inclusion of the community area Garfield Ridge in Majority-Nonwhite indicators but not Majority-Minority indicators (See Figures: 8.1-2, 8.1-3 & 8.1-5). Garfield Ridge is the community area which contains the terminal for Midway International Airport. Rides going to or coming from an airport may be priced differently than regular rides, especially for TNPs who require permits to pick up directly from the terminal.

4.4 Route Results

When we observe trips at the Route-Level, we start to see a divergent trend between taxi fares and rideshare fares for trips including a minority community. Taxi fares are on average more expensive for trips going to, from, or between minority communities, but TNP trips get cheaper for similar trips. Taxi trips traveling between a minority-community and non-minority community have at least 16% *higher* fare (either subtotal or total) than trips between non-minority communities, but TNP trips between a minority community and non-minority

	Majority-Minority		Majority-Nonwhite	
	(1) Log(Fare)	(2) Log(Total Fare)	(1) Log(Fare)	(2) Log(Total Fare)
Intercept	-320.8335 (11.3826)	-432.4108 (9.1187)	-116.0865 (11.1857)	-355.1794 (8.9560)
Pooled Indicator	-0.3901 (0.0004)	-0.4369 (0.0003)	-0.3861 (0.0004)	-0.4347 (0.0003)
Not-to-Min Indicator	0.2492 (0.0029)	0.2093 (0.0023)	0.1900 (0.0013)	0.2011 (0.0010)
Min-to-Not Indicator	0.2801 (0.0046)	0.2150 (0.0037)	0.1660 (0.0014)	0.1617 (0.0012)
Min-to-Min Indicator	0.2087 (0.0062)	0.0923 (0.0050)	0.3516 (0.0022)	0.3228 (0.0018)
Rideshare Indicator	-0.2486 (0.0005)	-0.0518 (0.0004)	-0.2351 (0.0006)	-0.0202 (0.0005)
Rideshare × Not-to-Min	-0.1763 (0.0029)	-0.1883 (0.0024)	-0.0475 (0.0012)	-0.1038 (0.0010)
Rideshare × Min-to-Not	-0.1873 (0.0046)	-0.1780 (0.0037)	-0.0234 (0.0014)	-0.0633 (0.0011)
Rideshare × Min-to-Min	-0.1507 (0.0062)	-0.0890 (0.0050)	-0.1708 (0.0022)	-0.2011 (0.0018)
R²	0.7371	0.7831	0.7422	0.7875
Model df	69	69	69	69
Observations	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses. Community Area Controls from CMAP (2019).

Route Indicators Exclude Pickup and Dropoff from same community.

Routes Indicators named in Pickup-to-Dropoff form where Min is minority-community and Not is not minority-community using respective minority-community definitions.

Observations with null community area values are filled with community-area averages.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included.

Table 4.4-2

**OLS Estimates of Difference in Total Fare
In Majority-Minority Communities, By Majority Race**

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Pickup Community Indicator	0.0472 (0.0010)	0.0644 (0.0037)	-0.0734 (0.0052)			
Drop-off Community Indicator	0.1104 (0.0010)	0.1218 (0.0030)	0.1015 (0.0034)			
Not-to-Min Indicator				0.1990 (0.0010)	0.2610 (0.0033)	0.1839 (0.0035)
Min-to-Not Indicator				0.1518 (0.0011)	0.3037 (0.0045)	0.1153 (0.0060)
Min-to-Min Indicator				0.2994 (0.0018)	0.1112 (0.0062)	-0.0548 (0.0158)
Rideshare Indicator	-0.0183 (0.0005)	-0.0473 (0.0004)	-0.0484 (0.0004)	-0.0165 (0.0005)	-0.0459 (0.0004)	-0.0485 (0.0004)
Rideshare × Pickup	-0.0291 (0.0009)	-0.0617 (0.0036)	0.0371 (0.0052)			
Rideshare × Drop-off	-0.0937 (0.0009)	-0.1421 (0.0029)	-0.1539 (0.0033)			
Rideshare × Not-to-Min				-0.0992 (0.0010)	-0.1955 (0.0032)	-0.1760 (0.0035)
Rideshare × Min-to-Not				-0.0504 (0.0011)	-0.2182 (0.0045)	-0.0932 (0.0060)
Rideshare × Min-to-Min				-0.1775 (0.0018)	-0.0650 (0.0062)	0.0166 (0.0158)
Majority Race	Nonwhite	Black	Hispanic	Nonwhite	Black	Hispanic
Adjusted R²	0.7843	0.7838	0.7840	0.7887	0.7847	0.7839
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194
Model df	49	49	49	51	51	51

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community.

Community Area Controls from CMAP (2019).

Minority-community defined by Majority-nonwhite

Observations with null community area values are filled with average value from Chicago community-area.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked. Includes controls for trips to or from airports.

community are at least 2% *lower* fare than similar trips between white communities. We also see that trips between minority-communities are on average at least 9% *more* expensive for taxi trips than similar trips between non-minority communities but 8.9% *less* expensive for TNP trips under the same conditions. On average, TNP trips within minority communities are at least 14.08% less than similar taxi trips in minority communities.

Interestingly, for trips between non-minority communities TNP trips lose much of their savings relative to taxi trips after factoring in tip and additional charges. Before tip and additional charges, TNPs are ~24-25% less expensive than taxis, but after tip and additional charges this drops to only ~2-5% less expensive. This trend does not exist (or at least to the same degree) for rides between minority and non-minority communities or between minority communities. This might suggest that riders in white communities self-select TNPs with more expensive ‘extra’ features than minority-communities do or tip at a higher rate than minority communities, though it may also be an artifact of cash-tips being recorded less than electronic-tips.

When controlling for whether a trip is coming from or going to a community with an airport (O’Hare and Garfield Ridge) and defining majority-minority by which race is the majority reveals difference in how ridesharing benefits are distributed (See: *Table 4.4-2*). We see that ridesharing trips between nonwhite communities are 19.4% cheaper than taxis on average, but that trips between nonwhite communities are about 12% more expensive than trips strictly between majority-white communities. This trend does not present itself in trips between Hispanic communities, but it is present in trips for Black communities. TNPs on average offer 11% lower fare than taxis for trips between Black communities, but trips between Black communities are 4.6% more expensive than similar trips in non-Black communities. Furthermore, trips traveling to Black communities from non-Black communities are about 6% more expensive than trips between non-Black communities, and trips to non-Black communities from Black communities are about 8% more expensive on average than trips between non-Black communities.

5 DISCUSSION:

Despite point estimates’ sensitivity to model and variable definition, there are trends which emerge consistent from these results. First, much of the savings from ridesharing can be attributed to the ability to ‘pool’ rides. Second, even controlling for ‘pooled’ rides, TNPs on average offer lower fares than taxis especially to minority communities. However, these savings become relatively muted after factoring in tip and ‘additional charges’, identifying the cause for this disparity warrants further exploration (is there disparity in tipping between minority/majority communities, are different communities self-selecting additional services, is there a difference in tipping trends between TNP riders and taxi riders). Finally, even though TNPs offer better lower fare than taxis, fares are still higher for trips between minority-communities than for trips between non-minority communities. In general, the data indicates TNP services provide a cheap alternative to taxis for minority communities in Chicago, but prices are still higher for minority communities than non-minority communities.

Due to the limitations in available data, the scope of this paper is quite limited: covering only one city with less than a full year of observations. Though this paper does establish that fares are more expensive for minority communities on average, it does not attempt to explain a mechanism for why this difference exists nor does it show whether these trends are time

invariant. This difference in averages fares may be due to self-selection within minority or majority communities. For instance, racial groups in Chicago are highly concentrated geographically, so, factors common to that geographic location which drive traveling habits could be a cause of the difference in average. For example, if a racial group is concentrated in a section of Chicago with limited or inconsistent access to public transportation, they may use taxis or ride-hailing services for trips even for trips at a premium due to lack of other options. It is also possible these results are a snapshot which does not represent the long-term trend. It is possible that average fares for the races will converge over time – or that they are already in the process of doing so. As data on TNPs becomes more publicly available and as existing datasets mature, more insights into the long-term impact of TNPs can be explored.

Since this paper only covers Chicago, it is unclear how these results may translate to cities with different regulatory frameworks or different racial dynamics. However, this paper does show TNPs offer a cheaper alternative to taxis for minority communities in Chicago but also illustrates how the affordability of TNPs is not equally distributed between races.

6 CONCLUSION:

I find that TNPs provide a cheap alternative to taxis for minority communities in Chicago but that TNPs cost more on average in minority communities than non-minority communities. On average, TNPs charge about 19% less for trips between nonwhite communities compared to taxis but those trips are about 12% more expensive than for trips between white communities. Similarly, Black communities have 11% lower fares for TNP trips compared to similar taxi trips, but trips between Black communities have on average 4.6% higher fare than trips between non-Black communities.

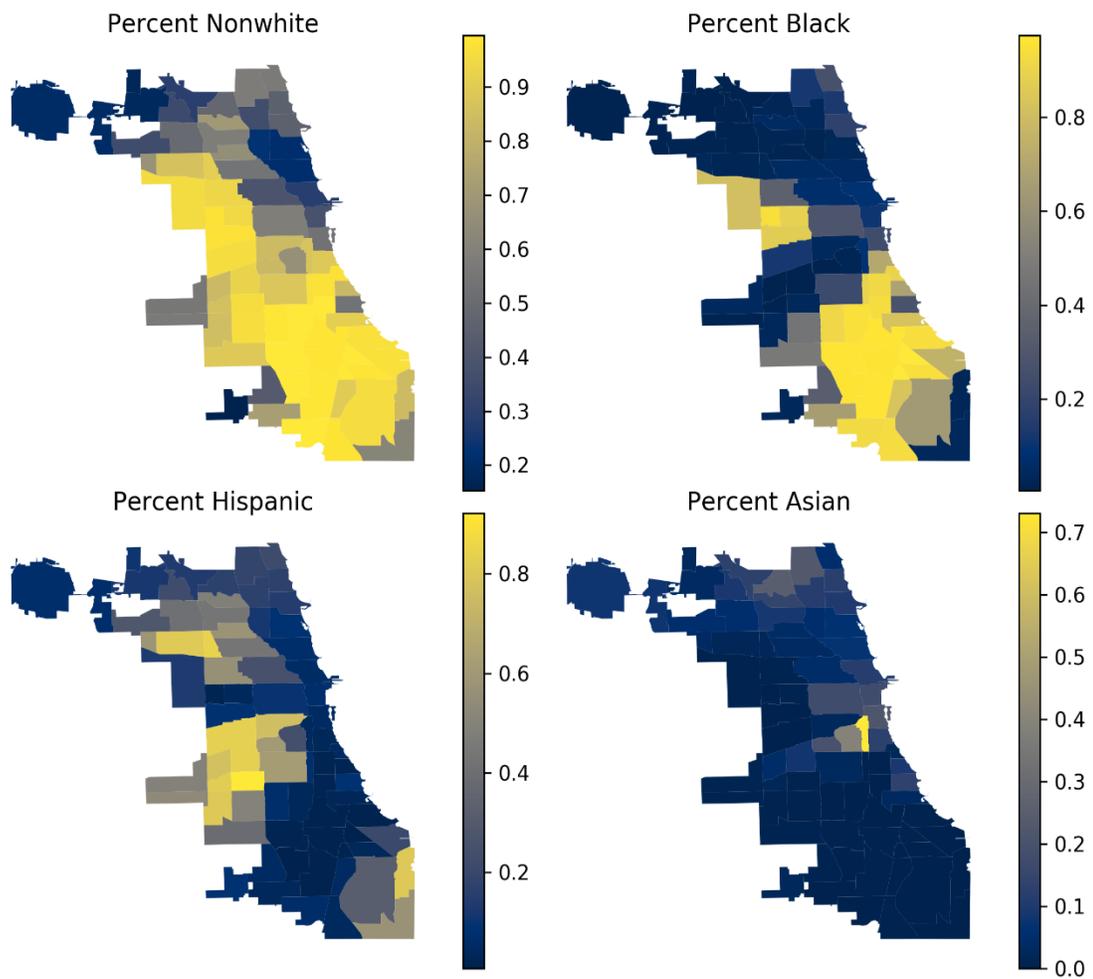
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8 APPENDIX:

8.1 Figures:

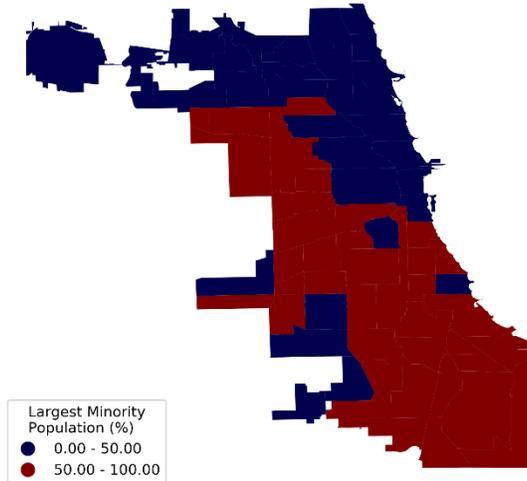
**Figure 8.1-1:
Location of Racial Minorities in Chicago Community Areas**



American Communities Survey 2013-17 5 Year Average

Figure 8.1-2:

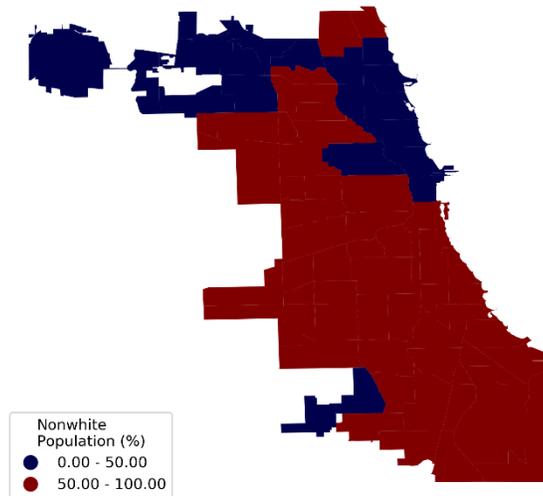
Majority-Minority Community Areas (Largest Nonwhite Racial Group over 50%)



American Communities Survey 2013-17 5 Year Average

Figure 8.1-3

Majority Nonwhite Community Areas (Nonwhite Population over 50%)



American Communities Survey 2013-17 5 Year Average

Figure 8.1-4:

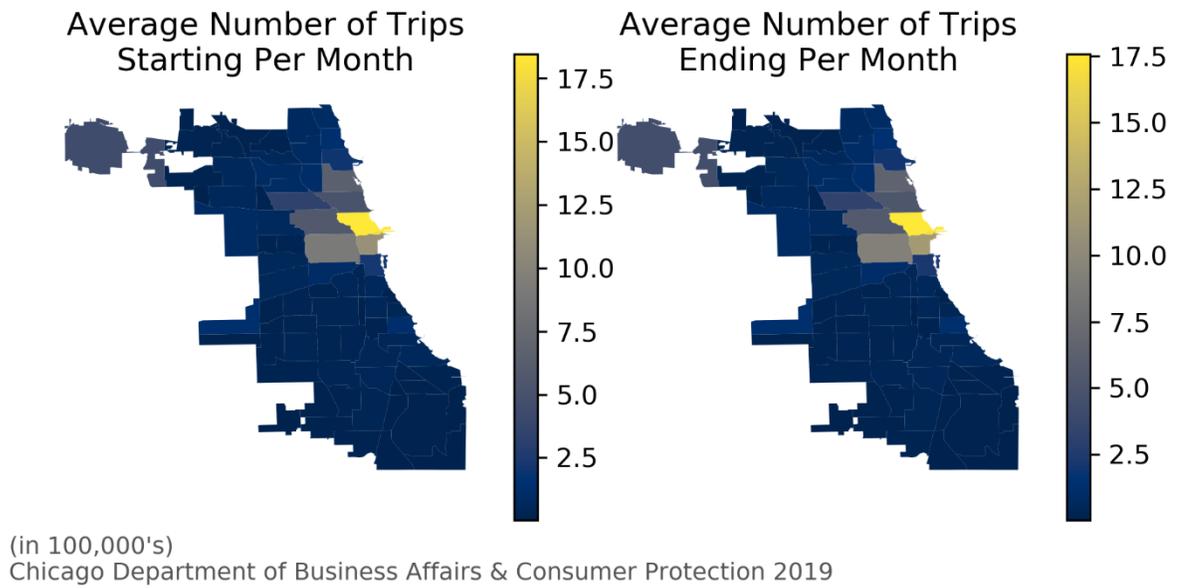
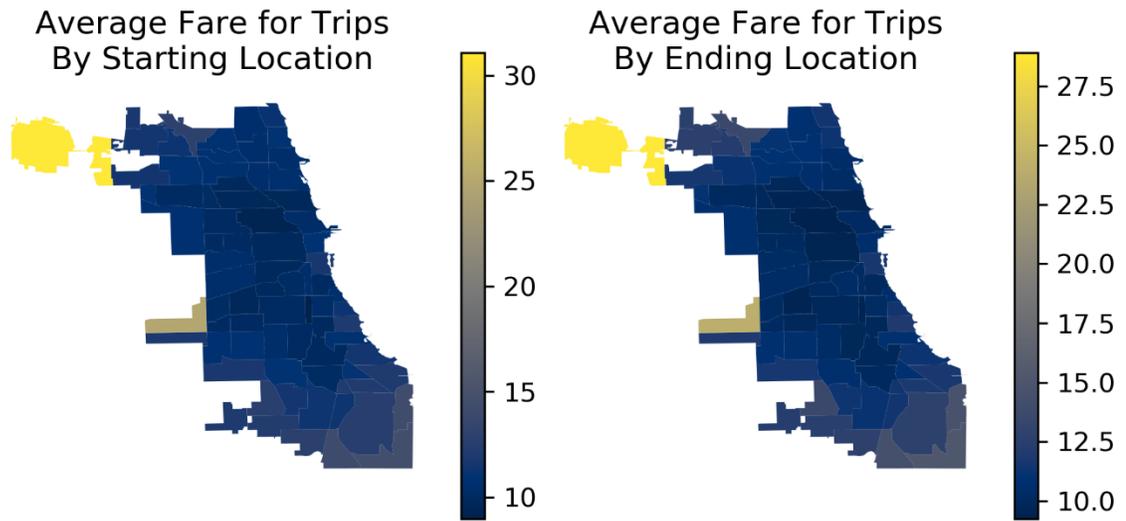
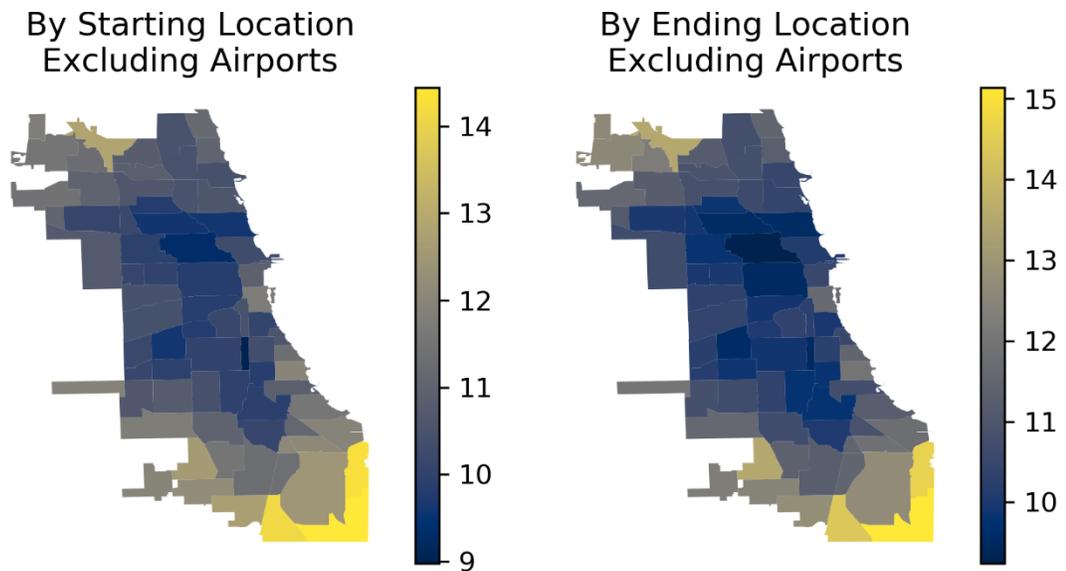


Figure 8.1-5



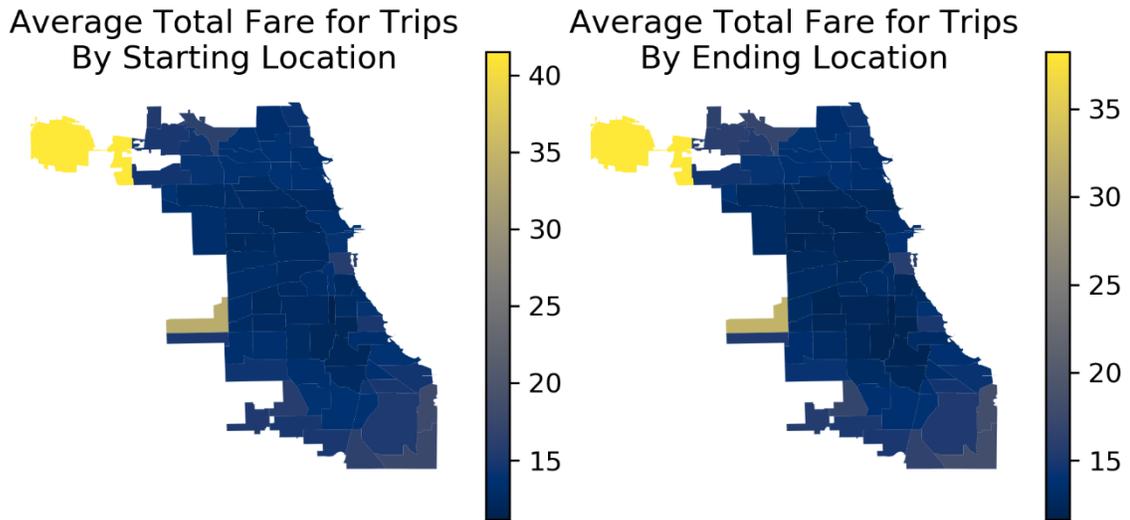
Chicago Department of Business Affairs & Consumer Protection 2019

Figure 8.1-6: Average Fare Excluding Airports



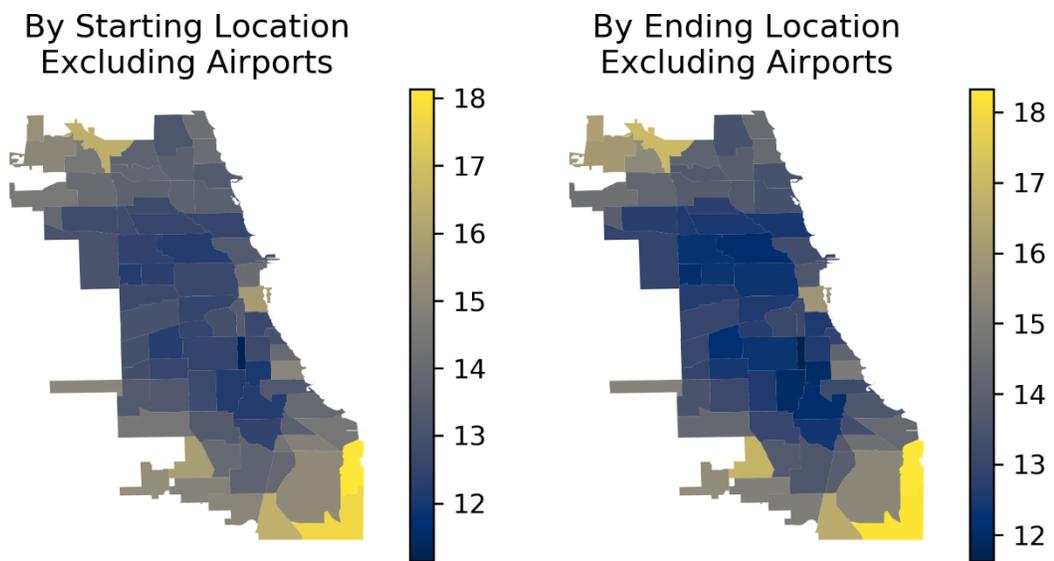
Chicago Department of Business Affairs & Consumer Protection 2019

Figure 8.1-7



Chicago Department of Business Affairs & Consumer Protection 2019

Figure 8.1-8: Average Total Fare Excluding Airports



Chicago Department of Business Affairs & Consumer Protection 2019

8.2 Summary Statistics and Definitions

	Count	Mean	Std. Dev	Min	25%	50%	75%	Max
Duration (seconds)	5,596,195	1079.8	798.7	2	526	855	1401	21409
Distance (miles)	5,596,195	5.96	6.76	0.01	1.70	3.5	7.50	288.3
Ride Pooled indicator	5,596,195	0.1960	0.3970	0	0	0	0	1
# Rides Pooled	5,596,195	1.2317	0.6899	1	1	1	1	16
Rideshare indicator	5,596,195	0.8886	0.3146	0	1	1	1	1
Majority-Minority pickup indicator	5,596,195	0.1537	0.3607	0	0	0	0	1
Majority-Minority drop-off indicator	5,596,195	0.1485	0.3556	0	0	0	0	1
Fare	5,596,195	\$12.05	\$10.47	\$0.01	\$5.00	\$8.00	\$15.00	\$482.50
Total Fare	5,596,195	\$15.80	\$12.52	\$0.01	\$7.55	\$12.00	\$17.55	\$491.35

Sources: Chicago Department of Business Affairs & Consumer Protection ([2016](#); [2018](#)), CMAP ([2019](#))

Notes:

Majority-minority indicators are defined as 1 if >50% of the population belongs to the same nonwhite racial group for corresponding Chicago Community Area.

Only nonnull-nonzero observations for duration, distance, and fare (total and subtotal).

Observations with distance > 300 miles, duration > 21600 seconds, or average speed > 80mph are discarded.

<i>Table 8.2-2</i>	Drop-off	Not Drop-off
Pickup	430,190 (7.7%)	429,994 (7.7%)
Not Pickup	400,854 (7.2%)	4,335,156 (77%)

(Percent's have been rounded)

Count (%) of Trips Picking up and Dropping-off in Majority-Nonwhite Community Areas		
<i>Table 8.2-3</i>	Drop-off	Not Drop-off
Pickup	1,360,929 (24%)	1,001,003 (18%)
Not Pickup	1,033,430 (18%)	2,200,832 (39%)

Null Values Filled Using Local Averages
(Percent's have been rounded)

Count (%) of Trips Picking up and Dropping-off in Majority-Nonwhite Community Areas		
<i>Table 8.2-4:</i>	Drop-off	Not Drop-off
Pickup	1,065,310 (19%)	982,398 (18%)
Not Pickup	959,774 (17%)	2,588,712 (46%)

Null Values Filled Using MSA Estimates
(Percent's have been rounded)

Table 8.2-5:

Table of Community-Area Control Groups

Control Group: (# variables)	Description:	Variables:
Population: (2)	Controls for size of population. Necessary because higher density/population areas will attract more drivers affecting fare.	Total Population, Population Density (persons per acre)
Economic: (4)	Controls for Economic conditions in community area. Community areas with lower employment rates and high homelessness rates may be less attractive destinations (fewer drivers).	Unemployment Rate, %Pop. Employed ¹ , %Population not living in household, %Households Renting
Income Distribution: (6)	Controls relative wealth of community. Should expect relatively wealthy communities to pay higher fares and relatively poorer communities to pay lower fares.	% of Population in Income Brackets: <\$25k, \$25-50k, \$50-75k, \$75-100k, \$100-150k, >\$150k
Transportation:(11)	Controlling for access to alternative transportation. If a community has less access to transportation (no vehicle, not walkable, low access to transit) they may be willing to pay higher fare than similar communities with better transportation access. Average VMT also helps control for traffic.	Commuting Rate ² , Average Vehicle Miles Traveled*, % of households with no vehicle, % Pop with access to transit*, % Employed with access to transit*, % Pop in 'highly walkable area'*, % Employ in 'highly walkable area'*, % Drive alone, % Carpool, % Take Transit, % Walk or Bike
Demographics:	Miscellaneous demographics which might affect fare, taxi or TNP usage. Includes: age variables, education rates, and nativity rates.	% Population retirement age or older, % Population under 19, % Population over 25 with at least an associate degree, % Population over 25 with less than high school degree, % Population foreign born, Median Age

* - Not included when filling null values with MSA estimates (Variable not in 2013-2017 ACS 5yr avg.)

¹ Including population not in labor force.

² % of population over 16 who commute to work or school.

Table 8.2-6

Summary Statistics of Taxi Rides in Chicago

	count	mean	std	min	25%	50%	75%	max
Duration (seconds)	623,403	916.79	868.50	2	391	618	1102	21409
Distance (miles)	623,403	4.21	5.86	0.01	0.90	1.53	4.18	196.90
Ride Pooled indicator	623,403	0	0	0	0	0	0	0
# Rides Pooled	623,403	1	0	1	1	1	1	1
Majority-minority pickup	623,403	0.017	0.1294	0	0	0	0	1
Majority-minority drop-off	623,403	0.032	0.1763	0	0	0	0	1
Fare	623,403	\$14.88	\$13.96	\$0.01	\$6.25	\$8.75	\$16.00	\$449.75
Total Fare	623,403	\$18.13	\$17.95	\$0.01	\$7.75	\$10.50	\$18.60	\$463.75

Sources: Chicago Department of Business Affairs & Consumer Protection ([2016](#); [2018](#)), CMAP ([2019](#))

Notes:

Majority-minority indicators are defined as 1 if >50% of the population belongs to the same nonwhite racial group for corresponding Chicago Community Area.

Only nonnull-nonzero observations for duration, distance, and fare (total and subtotal).

Observations with distance > 300 miles, duration > 21600 seconds, or average speed > 80mph are discarded.

Table 8.2-7:

Summary Statistics of TNP Rides in Chicago

	count	mean	std	min	25%	50%	75%	max
Duration (seconds)	4,972,791	1100.18	787.17	5	549	887	1425	20960
Distance (miles)	4,972,791	6.18	6.83	0.10	1.80	3.70	7.70	288.30
Ride Pooled indicator	4,972,791	0.2206	0.41	0	0	0	0	1
# Rides Pooled	4,972,791	1.2607	0.7267	1	1	1	1	16
Majority-minority pickup	4,972,791	0.1708	0.3764	0	0	0	0	1
Majority-minority drop-off	4,972,791	0.1631	0.3695	0	0	0	0	1
Fare	4,972,791	\$11.70	\$9.85	\$2.50	\$5.00	\$7.50	\$15.00	\$482.50
Total Fare	4,972,791	\$15.47	\$11.57	\$3.17	\$7.55	\$12.05	\$17.55	\$491.35

Sources: Chicago Department of Business Affairs & Consumer Protection ([2016](#); [2018](#)), CMAP ([2019](#))

Notes:

Majority-minority indicators are defined as 1 if >50% of the population belongs to the same nonwhite racial group for corresponding Chicago Community Area.

Only nonnull-nonzero observations for duration, distance, and fare (total and subtotal).

Observations with distance > 300 miles, duration > 21600 seconds, or average speed > 80mph are discarded.

8.3 Estimates on Majority-Minority

<i>Table 8.3-1</i>		OLS Estimate of Average Difference in Fare for Majority-Minority Communities				
	(1)	(2)	(3)	(4)	(5)	
	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	
Intercept	1.6429 (0.0003)	1.8407 (0.0005)	-100.1834 (12.9574)	1.8701 (0.0009)	-108.8580 (12.8763)	
Pooled Indicator	-0.4191 (0.0004)	-0.3895 (0.0004)	-0.3886 (0.0004)	-0.3858 (0.0004)	-0.3847 (0.0004)	
Maj-Minority Pickup	-0.0040 (0.0005)	0.0797 (0.0037)	0.0350 (0.0037)	0.0778 (0.0037)	0.0328 (0.0037)	
Maj-Minority Drop-off	0.0324 (0.0005)	0.2127 (0.0027)	0.1132 (0.0028)	0.2080 (0.0027)	0.1099 (0.0028)	
Rideshare		-0.2378 (0.0005)	-0.2431 (0.0005)	-0.2459 (0.0005)	-0.2480 (0.0005)	
Rideshare × Maj-Minority Pickup		-0.0663 (0.0037)	-0.0690 (0.0037)	-0.0630 (0.0037)	-0.0677 (0.0037)	
Rideshare × Maj-Minority Drop-off		-0.1751 (0.0028)	-0.1700 (0.0027)	-0.1707 (0.0027)	-0.1679 (0.0027)	
Controls	-	-	Yes	-	Yes	
Time Effects	-	-	-	Yes	Yes	
R²	0.7133	0.7257	0.7330	0.7291	0.7364	
Adjusted R²	0.7133	0.7257	0.7330	0.7291	0.7364	
Model df	5	8	68	27	87	
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	

Standard errors in parentheses.

Community-area controls are from CMAP(2019).

Null values for community-area control variables are filled with average value from Chicago community-areas.

Includes controls for distance, duration and trip pooled indicator.

Time Effects are sets of dummy variables for month, day of the week, and time of day.

Controls for rides pooled, community-area population, economic factors, income distribution, transportation access, and demographic factors included when marked.

Table 8.3-2

**OLS Estimate of Average Difference in Total Fare
for Majority-Minority Communities**

	(1)	(2)	(3)	(4)	(5)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Intercept	2.0419 (0.0002)	2.0969 (0.0004)	-313.3178 (10.3443)	2.1216 (0.0008)	-324.2096 (10.2725)
Pooled Indicator	-0.4564 (0.0003)	-0.4474 (0.0003)	-0.4363 (0.0003)	-0.4442 (0.0003)	-0.4328 (0.0003)
Maj-Minority Pickup	-0.0140 (0.0004)	-0.0036 (0.0031)	-0.0327 (0.0030)	-0.0045 (0.0030)	-0.0334 (0.0030)
Maj-Minority Drop-off	0.0165 (0.0004)	0.1586 (0.0022)	0.0773 (0.0022)	0.1553 (0.0022)	0.0751 (0.0022)
Rideshare Indicator		-0.0661 (0.0004)	-0.0488 (0.0004)	-0.0715 (0.0004)	-0.0529 (0.0004)
Rideshare × Maj-Minority Pickup		-0.0046 (0.0031)	-0.0285 (0.0029)	-0.0025 (0.0031)	-0.0279 (0.0029)
Rideshare × Maj-Minority Drop-off		-0.1435 (0.0023)	-0.1540 (0.0022)	-0.1408 (0.0023)	-0.1529 (0.0022)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7548	0.7563	0.7812	0.7592	0.7843
Adjusted R²	0.7548	0.7563	0.7812	0.7592	0.7843
Model df	5	8	68	27	87
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Community-area controls are from CMAP(2019).

Null values for community-area control variables are filled with average value from Chicago community-areas.

Includes controls for distance, duration and trip pooled indicator.

Time Effects are sets of dummy variables month, day of the week, and time of day.

Controls for rides pooled, community-area population, economic factors, income distribution, transportation access, and demographic factors included when marked.

8.4 Estimates on Majority-Nonwhite

Table 8.4-1

**OLS Estimate of Average Difference in Fare
for Majority-Nonwhite Communities with CCA Averages**

	(1)	(2)	(3)	(4)	(5)
	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)
Intercept	1.6360 (0.0003)	1.8090 (0.0006)	-183.4533 (12.9432)	1.8389 (0.0010)	-194.2252 (12.8622)
Pooled Indicator	-0.4199 (0.0004)	-0.3890 (0.0004)	-0.3892 (0.0004)	-0.3857 (0.0004)	-0.3854 (0.0004)
Maj-Nonwhite Pickup	-0.0054 (0.0003)	0.0450 (0.0011)	0.0655 (0.0014)	0.0456 (0.0011)	0.0648 (0.0014)
Maj-Nonwhite Drop-off	0.0342 (0.0003)	0.1206 (0.0010)	0.1007 (0.0013)	0.1200 (0.0010)	0.1009 (0.0013)
Rideshare Indicator		-0.2153 (0.0006)	-0.2180 (0.0006)	-0.2244 (0.0006)	-0.2230 (0.0006)
Rideshare × Maj-Nonwhite Pickup		-0.0359 (0.0012)	-0.0447 (0.0012)	-0.0343 (0.0012)	-0.0445 (0.0012)
Rideshare × Maj-Nonwhite Drop-off		-0.0856 (0.0011)	-0.0803 (0.0011)	-0.0844 (0.0011)	-0.0796 (0.0011)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7136	0.7262	0.7330	0.7297	0.7364
Adjusted R²	0.7136	0.7262	0.7330	0.7297	0.7364
Model df	5	8	68	27	87
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Community-area controls are from CMAP(2019).

Null values for community-area control variables are filled with average value from Chicago community-areas.

Includes controls for distance, duration and trip pooled indicator.

Time Effects are sets of dummy variables for month, day of the week, and time of day.

Controls for rides pooled, community-area population, economic factors, income distribution, transportation access, and demographic factors included when marked.

<i>Table 8.4-2</i>		OLS Estimate of Average Difference in Fare for Majority-Nonwhite Communities with MSA Averages				
	(1)	(2)	(3)	(4)	(5)	
	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	
Intercept	1.6414 (0.0003)	1.8235 (0.0006)	-154.7810 (12.9290)	1.8527 (0.0010)	-165.0585 (12.8481)	
Pooled Indicator	-0.4164 (0.0004)	-0.3860 (0.0004)	-0.3900 (0.0004)	-0.3824 (0.0004)	-0.3861 (0.0004)	
Maj-Nonwhite Pickup	-0.0025 (0.0003)	0.0503 (0.0011)	0.0608 (0.0013)	0.0515 (0.0011)	0.0597 (0.0013)	
Maj-Nonwhite Drop-off	0.0175 (0.0003)	0.0694 (0.0011)	0.0461 (0.0013)	0.0696 (0.0011)	0.0455 (0.0013)	
Rideshare Indicator		-0.2250 (0.0006)	-0.2270 (0.0006)	-0.2334 (0.0006)	-0.2316 (0.0006)	
Rideshare × Maj-Nonwhite Pickup		-0.0420 (0.0012)	-0.0494 (0.0012)	-0.0415 (0.0012)	-0.0500 (0.0012)	
Rideshare × Maj-Nonwhite Drop-off		-0.0462 (0.0011)	-0.0548 (0.0012)	-0.0461 (0.0011)	-0.0552 (0.0011)	
Controls	-	-	Yes	-	Yes	
Time Effects	-	-	-	Yes	Yes	
R²	0.7132	0.7254	0.7328	0.7288	0.7362	
Adjusted R²	0.7132	0.7254	0.7328	0.7288	0.7362	
Model df	5	8	68	27	87	
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	

Standard errors in parentheses.

Community-area controls are from CMAP(2019).

Null values for community-area control variables are filled with 2013-17 5-year ACS Chicago-Naperville-Elgin Metropolitan Statistical Area.

Includes controls for distance, duration and trip pooled indicator.

Time Effects are sets of dummy variables for month, day of the week, and time of day.

Controls for rides pooled, community-area population, economic factors, income distribution, transportation access, and demographic factors included when marked.

Table 8.4-3

**OLS Estimate of Average Difference in Total Fare
for Majority-Nonwhite Communities with CCA Averages**

	(1)	(2)	(3)	(4)	(5)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Intercept	2.0325 (0.0003)	2.0617 (0.0005)	-457.8366 (10.3309)	2.0868 (0.0008)	-469.9891 (10.2594)
Pooled Indicator	-0.4620 (0.0003)	-0.4509 (0.0003)	-0.4370 (0.0003)	-0.4479 (0.0003)	-0.4335 (0.0003)
Maj-Nonwhite Pickup	-0.0032 (0.0003)	0.0243 (0.0009)	0.0794 (0.0011)	0.0250 (0.0009)	0.0788 (0.0011)
Maj-Nonwhite Drop-off	0.0297 (0.0003)	0.1353 (0.0009)	0.1329 (0.0010)	0.1346 (0.0009)	0.1334 (0.0010)
Rideshare Indicator		-0.0383 (0.0005)	-0.0194 (0.0005)	-0.0444 (0.0005)	-0.0236 (0.0005)
Rideshare × Maj-Nonwhite Pickup		-0.0230 (0.0010)	-0.0381 (0.0009)	-0.0221 (0.0010)	-0.0384 (0.0009)
Rideshare × Maj-Nonwhite Drop-off		-0.1137 (0.0009)	-0.0950 (0.0009)	-0.1128 (0.0009)	-0.0945 (0.0009)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7552	0.7574	0.7813	0.7603	0.7844
Adjusted R²	0.7552	0.7574	0.7813	0.7603	0.7844
Model df	5	8	68	27	87
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Community-area controls are from CMAP(2019).

Null values for community-area control variables are filled with average value from Chicago community-areas

Includes controls for distance, duration and trip pooled indicator.

Time Effects are sets of dummy variables for month, day of the week, and time of day.

Controls for rides pooled, community-area population, economic factors, income distribution, transportation access, and demographic factors included when marked.

Table 8.4-4

**OLS Estimate of Average Difference in Total Fare
for Majority-Nonwhite Communities with MSA Averages**

	(1)	(2)	(3)	(4)	(5)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Intercept	2.0392 (0.0003)	2.0865 (0.0005)	-404.7577 (10.3326)	2.1111 (0.0008)	-416.6830 (10.2613)
Pooled Indicator	-0.4578 (0.0003)	-0.4482 (0.0003)	-0.4385 (0.0003)	-0.4451 (0.0003)	-0.4350 (0.0003)
Maj-Nonwhite Pickup	-0.0038 (0.0003)	0.0316 (0.0010)	0.0628 (0.0011)	0.0329 (0.0009)	0.0626 (0.0011)
Maj-Nonwhite Drop-off	0.0125 (0.0003)	0.0401 (0.0009)	0.0347 (0.0010)	0.0401 (0.0009)	0.0345 (0.0010)
Rideshare Indicator		-0.0589 (0.0005)	-0.0373 (0.0005)	-0.0644 (0.0005)	-0.0411 (0.0005)
Rideshare × Maj-Nonwhite Pickup		-0.0339 (0.0010)	-0.0442 (0.0010)	-0.0338 (0.0010)	-0.0452 (0.0010)
Rideshare × Maj-Nonwhite Drop-off		-0.0269 (0.0010)	-0.0330 (0.0009)	-0.0270 (0.0009)	-0.0334 (0.0009)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7548	0.7562	0.7806	0.7591	0.7836
Adjusted R²	0.7548	0.7562	0.7806	0.7591	0.7836
Model df	5	8	68	27	87
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Community-area controls are from CMAP(2019).

Null values for community-area control variables are filled with 2013-17 5-year ACS Chicago-Naperville-Elgin Metropolitan Statistical Area.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for rides pooled, community-area population, economic factors, income distribution, transportation access, and demographic factors included when marked.

8.5 Majority-Minority Route Estimates

Table 8.5-1

**OLS Estimate of Average Difference in Fare for Routes
between Majority-Minority and Not Majority-Minority Communities**

	(1) Log(Fare)	(2) Log(Fare)	(3) Log(Fare)	(4) Log(Fare)	(5) Log(Fare)
Intercept	1.6390 (0.0003)	1.8407 (0.0005)	-307.5651 (11.4512)	1.8690 (0.0009)	-320.8335 (11.3826)
Pooled Indicator	-0.4278 (0.0004)	-0.3972 (0.0004)	-0.3942 (0.0004)	-0.3932 (0.0004)	-0.3901 (0.0004)
Not-to-Min Indicator	0.0789 (0.0006)	0.2810 (0.0029)	0.2539 (0.0030)	0.2747 (0.0029)	0.2492 (0.0029)
Min-to-Not Indicator	0.0400 (0.0006)	0.2514 (0.0047)	0.2871 (0.0047)	0.2453 (0.0046)	0.2801 (0.0046)
Min-to-Min Indicator	0.0507 (0.0007)	0.2238 (0.0063)	0.2129 (0.0063)	0.2218 (0.0063)	0.2087 (0.0062)
Rideshare Indicator		-0.2413 (0.0005)	-0.2438 (0.0005)	-0.2492 (0.0005)	-0.2486 (0.0005)
Rideshare × Not-to-Min		-0.1943 (0.0030)	-0.1777 (0.0030)	-0.1905 (0.0030)	-0.1763 (0.0029)
Rideshare × Min-to-Not		-0.1924 (0.0047)	-0.1901 (0.0047)	-0.1870 (0.0047)	-0.1873 (0.0046)
Rideshare × Min-to-Min		-0.1537 (0.0063)	-0.1515 (0.0063)	-0.1500 (0.0063)	-0.1507 (0.0062)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7143	0.7271	0.7338	0.7304	0.7371
Adjusted R²	0.7143	0.7271	0.7338	0.7304	0.7371
Model df	6	10	50	29	69
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community

Routes Indicators named in Pickup-to-Dropoff form where

Min means Majority-Minority and Not means Not Majority-Minority

Community Area Controls from CMAP (2019).

Observations with null community area values are filled with average value from Chicago community-area

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables month, day of the week, and time of day . Controls for community-area population, income distribution, and transportation access included when marked.

Table 8.5-2

**OLS Estimate of Average Difference in Total Fare for Routes
between Majority-Minority and Not Majority-Minority Communities**

	(1)	(2)	(3)	(4)	(5)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Intercept	2.0394 (0.0002)	2.0949 (0.0004)	-416.4059 (9.1806)	2.1192 (0.0008)	-432.4108 (9.1187)
Pooled Indicator	-0.4613 (0.0003)	-0.4515 (0.0003)	-0.4405 (0.0003)	-0.4481 (0.0003)	-0.4369 (0.0003)
Not-to-Min Indicator	0.0362 (0.0005)	0.2268 (0.0024)	0.2127 (0.0024)	0.2223 (0.0024)	0.2093 (0.0023)
Min-to-Not Indicator	0.0046 (0.0005)	0.1683 (0.0039)	0.2196 (0.0037)	0.1646 (0.0039)	0.2150 (0.0037)
Min-to-Min Indicator	0.0210 (0.0005)	0.0845 (0.0052)	0.0948 (0.0050)	0.0833 (0.0052)	0.0923 (0.0050)
Rideshare Indicator		-0.0664 (0.0004)	-0.0477 (0.0004)	-0.0716 (0.0004)	-0.0518 (0.0004)
Rideshare × Not-to-Min		-0.1942 (0.0025)	-0.1889 (0.0024)	-0.1919 (0.0025)	-0.1883 (0.0024)
Rideshare × Min-to-Not		-0.1602 (0.0039)	-0.1797 (0.0037)	-0.1567 (0.0039)	-0.1780 (0.0037)
Rideshare × Min-to-Min		-0.0588 (0.0053)	-0.0888 (0.0050)	-0.0568 (0.0052)	-0.0890 (0.0050)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7550	0.7567	0.7800	0.7596	0.7831
Adjusted R²	0.7550	0.7567	0.7800	0.7596	0.7831
Model df	6.0000	10	50	29	69
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community

Routes Indicators named in Pickup-to-Dropoff form where

Min means Majority-Minority and Not means Not Majority-Minority

Community Area Controls from CMAP (2019).

Observations with null community area values are filled with average value from Chicago community-area

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked.

8.6 Majority-Nonwhite Route Estimates

OLS Estimate of Average Difference in Fare for Routes between Majority-Nonwhite and Not Majority-Nonwhite Communities with CCA Averages					
<i>Table 8.6-1</i>	(1)	(2)	(3)	(4)	(5)
	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)
Intercept	1.6097 (0.0003)	1.8014 (0.0006)	-93.8810 (11.2522)	1.8304 (0.0010)	-116.0865 (11.1857)
Pooled Indicator	-0.4299 (0.0004)	-0.3978 (0.0004)	-0.3899 (0.0004)	-0.3941 (0.0004)	-0.3861 (0.0004)
White-to-Non Indicator	0.1139 (0.0004)	0.1693 (0.0012)	0.1912 (0.0013)	0.1691 (0.0012)	0.1900 (0.0013)
Non-to-White Indicator	0.0754 (0.0004)	0.1033 (0.0013)	0.1675 (0.0014)	0.1046 (0.0013)	0.1660 (0.0014)
Non-to-Non Indicator	0.0935 (0.0004)	0.2790 (0.0022)	0.3557 (0.0022)	0.2752 (0.0022)	0.3516 (0.0022)
Rideshare Indicator		-0.2332 (0.0006)	-0.2307 (0.0006)	-0.2413 (0.0006)	-0.2351 (0.0006)
Rideshare × White-to-Non		-0.0562 (0.0013)	-0.0467 (0.0012)	-0.0571 (0.0013)	-0.0475 (0.0012)
Rideshare × Non-to-White		-0.0162 (0.0014)	-0.0219 (0.0014)	-0.0168 (0.0014)	-0.0234 (0.0014)
Rideshare × Non-to-Non		-0.1694 (0.0022)	-0.1719 (0.0022)	-0.1647 (0.0022)	-0.1708 (0.0022)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7176	0.7310	0.7390	0.7344	0.7422
Adjusted R²	0.7176	0.7310	0.7390	0.7344	0.7422
Model df	6	10	50	29	69
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community

Routes Indicators named in Pickup-to-Dropoff form where

Non means Majority-Nonwhite and white means Not Majority-Nonwhite

Community Area Controls from CMAP (2019).

Observations with null community area values are filled with average value from Chicago community-area

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked.

Table 8.6-2 **OLS Estimate of Average Difference in Fare for Routes between Majority-Nonwhite and Not Majority-Nonwhite Communities with MSA Averages**

	(1) Log(Fare)	(2) Log(Fare)	(3) Log(Fare)	(4) Log(Fare)	(5) Log(Fare)
Intercept	1.6168 (0.0003)	1.8156 (0.0006)	-39.6148 (11.2694)	1.8435 (0.0010)	-63.1175 (11.2037)
Pooled Indicator	-0.4287 (0.0004)	-0.3966 (0.0004)	-0.3927 (0.0004)	-0.3927 (0.0004)	-0.3886 (0.0004)
White-to-Non Indicator	0.0892 (0.0004)	0.1078 (0.0013)	0.1445 (0.0013)	0.1084 (0.0012)	0.1437 (0.0013)
Non-to-White Indicator	0.0686 (0.0004)	0.0934 (0.0013)	0.1652 (0.0014)	0.0953 (0.0013)	0.1644 (0.0014)
Non-to-Non Indicator	0.0764 (0.0005)	0.2742 (0.0025)	0.3347 (0.0025)	0.2716 (0.0025)	0.3316 (0.0025)
Rideshare Indicator		-0.2410 (0.0006)	-0.2366 (0.0006)	-0.2482 (0.0006)	-0.2406 (0.0006)
Rideshare × White-to-Non		-0.0130 (0.0013)	-0.0152 (0.0013)	-0.0155 (0.0013)	-0.0172 (0.0013)
Rideshare × Non-to-White		-0.0148 (0.0014)	-0.0199 (0.0014)	-0.0170 (0.0014)	-0.0223 (0.0014)
Rideshare × Non-to-Non		-0.1819 (0.0025)	-0.1960 (0.0025)	-0.1790 (0.0025)	-0.1965 (0.0025)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7163	0.7293	0.7383	0.7327	0.7415
Adjusted R²	0.7163	0.7293	0.7383	0.7327	0.7415
Model df	6	10	50	29	69
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community

Routes Indicators named in Pickup-to-Dropoff form where

Non means Majority-Nonwhite and white means Not Majority-Nonwhite

Community Area Controls from CMAP (2019).

Observations with null community area values are filled with 2013-17 5-year ACS Chicago-Naperville-Elgin Metropolitan Statistical Area.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked.

Table 8.6-3

**OLS Estimate of Average Difference in Total Fare for Routes
between Majority-Nonwhite and Majority-White Communities
with CCA Averages**

	(1)	(2)	(3)	(4)	(5)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Intercept	2.0149 (0.0002)	2.0455 (0.0005)	-332.3662 (9.0158)	2.0700 (0.0008)	-355.1794 (8.9560)
Pooled Indicator	-0.4666 (0.0003)	-0.4550 (0.0003)	-0.4381 (0.0003)	-0.4518 (0.0003)	-0.4347 (0.0003)
White-to-Non Indicator	0.0894 (0.0004)	0.2001 (0.0010)	0.2017 (0.0010)	0.1996 (0.0010)	0.2011 (0.0010)
Non-to-White Indicator	0.0576 (0.0004)	0.1039 (0.0011)	0.1626 (0.0012)	0.1051 (0.0011)	0.1617 (0.0012)
Non-to-Non Indicator	0.0626 (0.0004)	0.2568 (0.0018)	0.3258 (0.0018)	0.2539 (0.0018)	0.3228 (0.0018)
Rideshare Indicator		-0.0384 (0.0005)	-0.0165 (0.0005)	-0.0437 (0.0005)	-0.0202 (0.0005)
Rideshare × White-to-Non		-0.1252 (0.0010)	-0.1031 (0.0010)	-0.1257 (0.0010)	-0.1038 (0.0010)
Rideshare × Non-to-White		-0.0493 (0.0012)	-0.0617 (0.0011)	-0.0499 (0.0012)	-0.0633 (0.0011)
Rideshare × Non-to-Non		-0.1981 (0.0019)	-0.2016 (0.0018)	-0.1949 (0.0018)	-0.2011 (0.0018)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7580	0.7606	0.7846	0.7635	0.7875
Adjusted R²	0.7580	0.7606	0.7845	0.7634	0.7875
Model df	6	10	50	29	69
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community

Routes Indicators named in Pickup-to-Dropoff form where

Non means Majority-Nonwhite and white means Not Majority-Nonwhite

Community Area Controls from CMAP (2019).

Minority-community defined by Majority-nonwhite

Observations with null community area values are filled with average value from Chicago community-area.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked.

Table 8.6-4

**OLS Estimate of Average Difference in Total Fare for Routes
between Majority-Nonwhite and Majority-White Communities
with MSA Averages**

	(1)	(2)	(3)	(4)	(5)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Intercept	2.0251 (0.0002)	2.0718 (0.0005)	-298.1336 (9.0444)	2.0957 (0.0008)	-321.9025 (8.9849)
Pooled Indicator	-0.4656 (0.0003)	-0.4548 (0.0003)	-0.4405 (0.0003)	-0.4514 (0.0003)	-0.4369 (0.0003)
White-to-Non Indicator	0.0513 (0.0004)	0.0868 (0.0010)	0.1187 (0.0011)	0.0872 (0.0010)	0.1183 (0.0011)
Non-to-White Indicator	0.0347 (0.0004)	0.0839 (0.0011)	0.1530 (0.0011)	0.0857 (0.0011)	0.1531 (0.0011)
Non-to-Non Indicator	0.0487 (0.0004)	0.2176 (0.0021)	0.2726 (0.0020)	0.2159 (0.0021)	0.2708 (0.0020)
Rideshare Indicator		-0.0573 (0.0005)	-0.0338 (0.0005)	-0.0620 (0.0005)	-0.0372 (0.0005)
Rideshare × White-to-Non		-0.0381 (0.0011)	-0.0328 (0.0011)	-0.0399 (0.0011)	-0.0345 (0.0011)
Rideshare × Non-to-White		-0.0512 (0.0012)	-0.0549 (0.0011)	-0.0531 (0.0012)	-0.0573 (0.0011)
Rideshare × Non-to-Non		-0.1693 (0.0021)	-0.1830 (0.0020)	-0.1675 (0.0021)	-0.1838 (0.0020)
Controls	-	-	Yes	-	Yes
Time Effects	-	-	-	Yes	Yes
R²	0.7561	0.7568	0.7816	0.7597	0.7846
Adjusted R²	0.7561	0.7568	0.7816	0.7597	0.7846
Model df	6	10	50	29	69
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community

Routes Indicators named in Pickup-to-Dropoff form where

Non means Majority-Nonwhite and white means Not Majority-Nonwhite

Community Area Controls from CMAP (2019).

Observations with null community area values are filled with 2013-17 5-year ACS Chicago-Naperville-Elgin Metropolitan Statistical Area.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked.

8.7 Granular Race Tables:

OLS Estimates of Difference in Fare						
In Majority-Minority Communities, By Majority Race						
	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)
Pickup Community Indicator	0.0505 (0.0013)	0.1171 (0.0046)	-0.0048 (0.0065)			
Drop-off Community Indicator	0.0904 (0.0012)	0.1483 (0.0038)	0.1368 (0.0042)			
Not-to-Min Indicator				0.1898 (0.0013)	0.2958 (0.0041)	0.2230 (0.0044)
Min-to-Not Indicator				0.1617 (0.0014)	0.3614 (0.0057)	0.1819 (0.0076)
Min-to-Min Indicator				0.3416 (0.0022)	0.2203 (0.0078)	0.0892 (0.0199)
Rideshare Indicator	-0.2174 (0.0006)	-0.2434 (0.0005)	-0.2453 (0.0005)	-0.2307 (0.0006)	-0.2426 (0.0005)	-0.2462 (0.0005)
Rideshare × Pickup	-0.0384 (0.0012)	-0.1040 (0.0046)	-0.0089 (0.0065)			
Rideshare × Drop-off	-0.0789 (0.0011)	-0.1625 (0.0037)	-0.1728 (0.0042)			
Rideshare × Not-to-Min				-0.0446 (0.0012)	-0.1905 (0.0041)	-0.1732 (0.0044)
Rideshare × Min-to-Not				-0.0159 (0.0014)	-0.2329 (0.0056)	-0.1129 (0.0076)
Rideshare × Min-to-Min				-0.1590 (0.0022)	-0.1300 (0.0078)	-0.0868 (0.0199)
Majority Race	Nonwhite	Black	Hispanic	Nonwhite	Black	Hispanic
Adjusted R²	0.7336	0.7334	0.7334	0.7399	0.7347	0.7337
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194
Model df	49	49	49	51	51	51

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community.

Community Area Controls from CMAP (2019).

Minority-community defined by Majority-nonwhite

Observations with null community area values are filled with average value from Chicago community-area.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked. Includes controls for trips to or from airports.

Table 8.7-2

**OLS Estimates of Difference in Total Fare
In Majority-Minority Communities, By Majority Race**

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)	Log(Total Fare)
Pickup Community Indicator	0.0472 (0.0010)	0.0644 (0.0037)	-0.0734 (0.0052)			
Drop-off Community Indicator	0.1104 (0.0010)	0.1218 (0.0030)	0.1015 (0.0034)			
Not-to-Min Indicator				0.1990 (0.0010)	0.2610 (0.0033)	0.1839 (0.0035)
Min-to-Not Indicator				0.1518 (0.0011)	0.3037 (0.0045)	0.1153 (0.0060)
Min-to-Min Indicator				0.2994 (0.0018)	0.1112 (0.0062)	-0.0548 (0.0158)
Rideshare Indicator	-0.0183 (0.0005)	-0.0473 (0.0004)	-0.0484 (0.0004)	-0.0165 (0.0005)	-0.0459 (0.0004)	-0.0485 (0.0004)
Rideshare × Pickup	-0.0291 (0.0009)	-0.0617 (0.0036)	0.0371 (0.0052)			
Rideshare × Drop-off	-0.0937 (0.0009)	-0.1421 (0.0029)	-0.1539 (0.0033)			
Rideshare × Not-to-Min				-0.0992 (0.0010)	-0.1955 (0.0032)	-0.1760 (0.0035)
Rideshare × Min-to-Not				-0.0504 (0.0011)	-0.2182 (0.0045)	-0.0932 (0.0060)
Rideshare × Min-to-Min				-0.1775 (0.0018)	-0.0650 (0.0062)	0.0166 (0.0158)
Majority Race	Nonwhite	Black	Hispanic	Nonwhite	Black	Hispanic
Adjusted R²	0.7843	0.7838	0.7840	0.7887	0.7847	0.7839
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194
Model df	49	49	49	51	51	51

Standard errors in parentheses.

Route Indicators Exclude Pickup and Dropoff from same community.

Community Area Controls from CMAP (2019).

Minority-community defined by Majority-nonwhite

Observations with null community area values are filled with average value from Chicago community-area.

Includes controls for distance, duration and trip pooled indicator. Time Effects are sets of dummy variables for month, day of the week, and time of day. Controls for community-area population, income distribution, and transportation access included when marked. Includes controls for trips to or from airports.

8.8 Fill Methods

Table 8.8-1 OLS Estimates of Rideshare in Majority-Minority Communities on Fare, Using Different Methods to Fill Null Values						
	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)	Log(Fare)
Majority-Minority Pickup Indicator	0.0545 (0.0038)	0.0422 (0.0038)	0.0547 (0.0038)			
Majority-Minority Drop-off Indicator	0.1510 (0.0029)	0.1367 (0.0029)	0.1512 (0.0029)			
Not-to-Min				0.3020 (0.0030)	0.3054 (0.0031)	0.3021 (0.0030)
Min-to-Not				0.3106 (0.0047)	0.3152 (0.0047)	0.3107 (0.0047)
Min-to-Min				0.2881 (0.0063)	0.2933 (0.0063)	0.2882 (0.0063)
Rideshare	-0.2449 (0.0005)	-0.2450 (0.0005)	-0.2449 (0.0005)	-0.2443 (0.0005)	-0.2444 (0.0005)	-0.2443 (0.0005)
Rideshare × Minority Pickup	-0.0674 (0.0037)	-0.0675 (0.0037)	-0.0674 (0.0037)			
Rideshare × Minority Drop-off	-0.1702 (0.0027)	-0.1703 (0.0027)	-0.1702 (0.0027)			
Rideshare × Not-to-Min				-0.1827 (0.0030)	-0.1826 (0.0030)	-0.1827 (0.0030)
Rideshare × Min-to-Not				-0.1912 (0.0047)	-0.1910 (0.0047)	-0.1912 (0.0047)
Rideshare × Min-to-Min				-0.1591 (0.0063)	-0.1599 (0.0063)	-0.1592 (0.0063)
Fill Method	Drop	CCA Avg	MSA Avg	Drop	CCA Avg	MSA Avg
Adjusted R²	0.7326	0.7326	0.7326	0.7345	0.7345	0.7345
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194
Model df	58	58	58	60	60	60

Standard errors in parentheses.

Duration and Distance used as control.

Fill Methods:

Drop indicates that null values were dropped before running the regression, observations only come from trips both starting and ending in Chicago with a recorded position.

CA Avg indicates null values were replaced with the mean value of Chicago's community areas, this implicitly assumes trips that start outside of Chicago come from demographically similar places.

MSA Avg indicates null values were replaced with estimates from the Chicago-Naperville-Elgin Metropolitan Statistical Area taken from the 2013-2017 ACS 5 year average. MSA data was collected separately from community area level data and thus do not cover all the same variables (Controls which do not have an MSA Avg are excluded). Variables were calculated to my best approximation of CMAP's methods.

OLS Estimates of Rideshare in Majority-Minority Communities on Total Fare, Using Different Methods to Fill Null Values

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Total Fare)					
Majority-Minority Pickup Indicator	0.0077 (0.0030)	-0.0106 (0.0031)	0.0080 (0.0030)			
Majority-Minority Drop-off Indicator	0.1319 (0.0023)	0.1121 (0.0023)	0.1323 (0.0023)			
Not-to-Min				0.2624 (0.0024)	0.2610 (0.0025)	0.2626 (0.0024)
Min-to-Not				0.2486 (0.0038)	0.2480 (0.0038)	0.2488 (0.0038)
Min-to-Min				0.1748 (0.0051)	0.1705 (0.0051)	0.1752 (0.0051)
Rideshare	-0.0522 (0.0004)	-0.0523 (0.0004)	-0.0522 (0.0004)	-0.0502 (0.0004)	-0.0503 (0.0004)	-0.0502 (0.0004)
Rideshare × Minority Pickup	-0.0243 (0.0029)	-0.0246 (0.0029)	-0.0243 (0.0029)			
Rideshare × Minority Drop-off	-0.1530 (0.0022)	-0.1529 (0.0022)	-0.1530 (0.0022)			
Rideshare × Not-to-Min				-0.1929 (0.0024)	-0.1919 (0.0024)	-0.1929 (0.0024)
Rideshare × Min-to-Not				-0.1786 (0.0037)	-0.1780 (0.0037)	-0.1786 (0.0037)
Rideshare × Min-to-Min				-0.0950 (0.0050)	-0.0954 (0.0050)	-0.0950 (0.0050)
Fill Method	Drop	CCA Avg	MSA Avg	Drop	CCA Avg	MSA Avg
Adjusted R²	0.7794	0.7794	0.7794	0.7804	0.7802	0.7804
Observations	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194	5,596,194
Model df	58	58	58	60	60	60

Standard errors in parentheses.

Duration and Distance used as control.

Fill Methods:

Drop indicates that null values were dropped before running the regression, observations only come from trips both starting and ending in Chicago with a recorded position.

CA Avg indicates null values were replaced with the mean value of Chicago's community areas, this implicitly assumes trips that start outside of Chicago come from demographically similar places.

MSA Avg indicates null values were replaced with estimates from the Chicago-Naperville-Elgin Metropolitan Statistical Area taken from the 2013-2017 ACS 5 year average. MSA data was collected separately from community area level data and thus do not cover all the same variables (Controls which do not have an MSA Avg are excluded). Variables were calculated to my best approximation of CMAP's methods.